

Limited Soils Investigation Pavement Design Recommendations SWC of 190th Street and Normandie Avenue Los Angeles, California

Prepared For:

Boeing Realty Corporation 4060 Lakewood Boulevard, 6th Floor Long Beach, California 90808-1700

Attn: Mr. Stephen Bisset

Project Number 5936-96 March 26, 1998

NorCal Engineering

SOILS AND GEOTECHNICAL CONSULTANTS 10641 HUMBOLT STREET LOS ALAMITOS, CA 90720 (562)799-9469 FAX (562)799-9459

March 26, 1998

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Boeing Realty Corporation 4060 Lakewood Boulevard, 6th Floor Long Beach, California 90808-1700

Attn: Mr. Stephen Bisset

RE: Limited Soils Investigation - Pavement Design Recommendations for Proposed Gateway Avenue - Located at the Boeing Facilities at the Southwest Corner of 190th Street and Normandie Avenue, in the City of Los Angeles, California

Dear Mr. Bisset:

Pursuant to your request, this firm has performed a Limited Soils Investigation for the above referenced project in accordance with your authorization. The purpose of this investigation is to evaluate the geotechnical conditions of the proposed roadway area and provide recommendations for the proposed pavement section. This geotechnical engineering report presents the finding of our study along with conclusions and recommendations for development.

Site Description

The proposed roadway area is currently undergoing demolition procedures. Portions of the roadway area have existing curb and gutter along the perimeter. Some scattered areas of asphalt still remained in place at the time of our investigation.

Field Investigation

The purpose of the investigation was to explore the subsurface conditions and to provide preliminary geotechnical engineering design parameters for evaluation of the site with respect to the proposed improvements.

The investigation consisted of the placement of eight subsurface exploratory excavations by backhoe to a maximum depth of 6 feet placed along the existing and proposed roadway area by client. The explorations were visually classified and logged by a field engineer with locations of the subsurface explorations shown on the attached Site Plan. The exploratory borings revealed the existing earth materials to consist of fill and natural soil zones. A detailed description of the subsurface conditions are listed on the excavation logs in Appendix A. These soils are described as follows:

Fill: Fill soils generally classifying as silty, sandy CLAY with occasional gravel, concrete and asphalt fragments were encountered in all borings. Fill soils ranged in depth from 2 to 4.5 feet and were generally noted to be medium stiff and moist.

Natural:

Natural soils classified as silty CLAY with some sand and were noted to be stiff and moist. No groundwater was encountered in the excavations.

Laboratory Tests

Relatively undisturbed samples of the subsurface soils were obtained to perform laboratory testing and analysis to determine in-place moisture/densities. These undisturbed samples consisted of one inch rings with inside diameter of 2.5 inches. Bulk bag samples were obtained in the upper soils for maximum density and R-Value tests.

- A. The field moisture content (ASTM:D 2216) and the dry density of the ring samples were determined in the laboratory. This data is listed on the logs of borings.
- B. Maximum density tests (ASTM: D-1557-78) were performed on typical samples of the upper soils. Results of these tests are shown on Table I.
- C. Resistance 'R' Value tests were conducted on representative soil samples to determine preliminary pavement section design for the proposed driveway areas. The results of our study are included later in this report.

Conclusions and Recommendations

Based upon our evaluations, the proposed development is acceptable from a geotechnical engineering standpoint. By following the recommendations and guidelines set forth in our report, the structures will be safe from slippage and settlements under the anticipated design loadings and conditions. The proposed development shall meet all requirements of the City Building Ordinance and will not impose any adverse effect on existing adjacent structures.

It is recommended that site inspections be performed by a representative of this firm during future grading and construction of the development to verify the findings and recommendations documented in this report. Any unusual conditions which may be encountered in the course of the project development may require the need for additional study and revised recommendations.

Site Grading Recommendations

Any vegetation and demolition debris shall be removed and hauled from proposed grading areas prior to the start of grading operations. Any removed soils may be reutilized as compacted fill once any deleterious material or oversized materials (in excess of eight inches) is removed. All grading operations shall be performed in accordance with the attached "Specifications for Compacted Fill Operations".

All upper fill soils (approximately 2 to 4.5 feet) shall be removed to competent native soils, the exposed surface scarified to a depth of 8 inches, brought to the proper moisture content and compacted to a minimum of 90% of the laboratory standard (ASTM: D-1557-78) prior to placement of any additional compacted fill soils, slabs-on-grade and pavement.

It is likely that isolated areas of undiscovered fill not described in this report are present on site. If found, these areas should be treated as discussed earlier. A diligent search shall also be conducted during grading operations in an effort to uncover any underground structures, irrigation or utility lines. If encountered, these structures and lines shall be either removed, properly abandoned or protected prior to the proposed construction.

Care should be taken to provide or maintain adequate lateral support for all adjacent improvements and structures at all times during the demolition and grading operations and construction phase. Adequate drainage away from the structures, pavement and slopes should be provided at all times.

Temporary Excavations

Temporary unsurcharged excavations in the existing site materials may be made at vertical inclinations up to 4 feet in height and then may be trimmed at a 1 to 1(horizontal to vertical) gradient up to a maximum height of 10 feet. Cuts in excess of 10 feet must be assessed by this firm prior to excavation procedures. In areas where soils with little or no binder are encountered, where adverse geological conditions are exposed, or where excavations are adjacent to existing structures, shoring, slot-cutting, or flatter excavations may be required. The temporary cut slope gradients given above do not preclude local raveling and sloughing. All excavations shall be made in accordance with the requirements of CAL-OSHA and other public agencies having jurisdiction.

Pavement Design

Tests on the existing soils revealed R-Values of 22 and 36. The following flexible pavement section design is provided based upon the lower of the test results. As identified by the City of Los Angeles, the roadway has been designated as a "local collector" road with a corresponding traffic index of 6.0. Using these values, the following pavement design is provided for review.

Flexible (Asphalt) Pavement Section Design

Traffic	Inches	Inches	
<u>Index</u>	<u>Asphalt</u>	<u>Base</u>	
6.0	4.0	9.0	

All subgrade soils shall be compacted to a minimum of 90% of the laboratory maximum dry density; base material shall be compacted to at least 95%.

Closure

The recommendations and conclusions contained in this report are based upon the soil conditions uncovered in our test excavations. No warranty of the soil condition between our excavations is implied. NorCal Engineering should be notified for possible further recommendations if unexpected to unfavorable conditions are encountered during construction phase. It is the responsibility of the owner to ensure that all information within this report is submitted to the Architect and appropriate Engineers for the project.

This firm should have the opportunity to review the final plans to verify that all our recommendations are incorporated. This report and all conclusions are subject to the review of the controlling authorities for the project.

A preconstruction conference should be held between the developer, general contractor, grading contractor, city inspector, architect, and soil engineer to clarify any questions relating to the grading operations and subsequent construction. Our representative should be present during the grading operations and construction phase to certify that such recommendations are complied within the field.

This limited geotechnical investigation has been conducted in a manner consistent with the level of care and skill exercised by members of our profession currently practicing under similar conditions in the Southern California area. No other warranty, expressed or implied is made.

We appreciate this opportunity to be of service to you. If you have any further questions, please do not hesitate to contact the undersigned.

No. 841

Exp. 12/31/00

Respectfully submitted,

NORCAL ENGINEERING

Keith D. Tucker Project Engineer

R.G.E. 841

WW WWW Mark A. Burkholder Project Manager

SPECIFICATIONS FOR PLACEMENT OF COMPACTED FILL

Preparation

Any existing low density soils and/or saturated soils shall be removed to competent natural soil under the inspection of the Soils Engineering Firm. After the exposed surface has been cleansed of debris and/or vegetation, it shall be scarified until it is uniform in consistency, brought to the proper moisture content and compacted to a minimum of 90% relative compaction (in accordance with ASTM: D-1557-78).

Material For Fill

The on-site soils or approved import soils may be utilized for the compacted fill provided they are free of any deleterious materials and shall not contain any rocks, brick, asphaltic concrete, concrete or other hard materials greater than eight inches in maximum dimensions. Any import soil must be approved by the Soils Engineering firm a minimum of 24 hours prior to importation to site.

Placement of Compacted Fill Soils

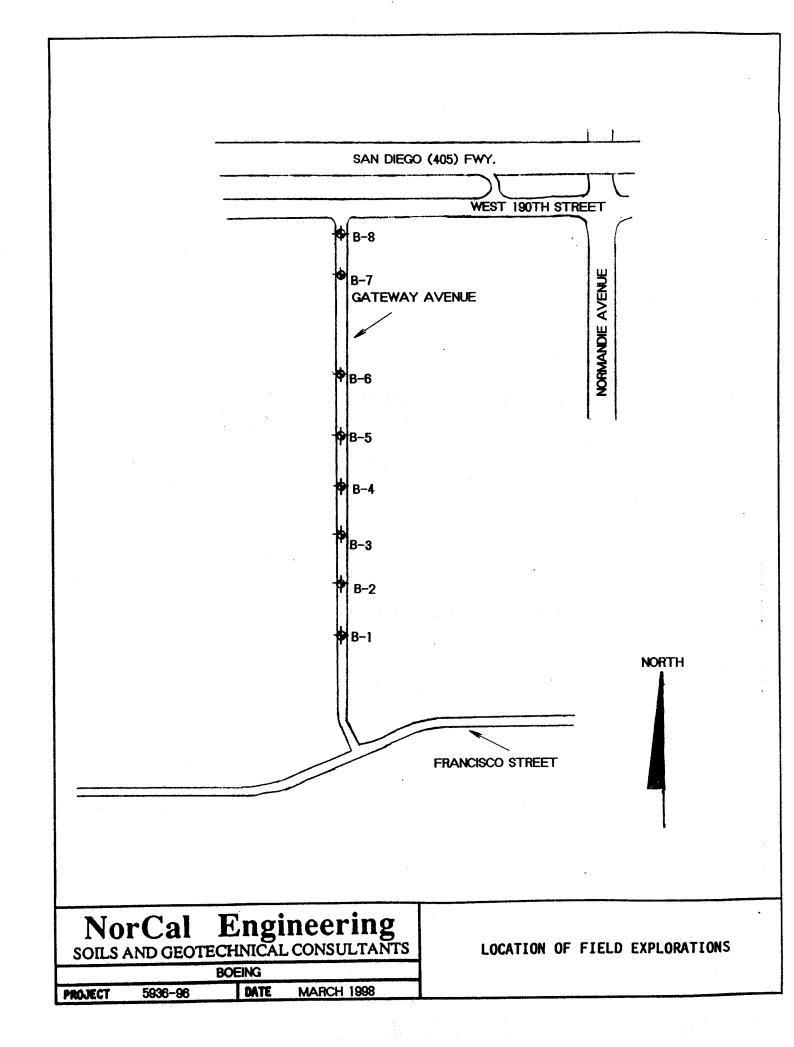
The approved fill soils shall be placed in layers not excess of six inches in thickness. Each lift shall be uniform in thickness and thoroughly blended. The fill soils shall be brought to within 15% of the optimum moisture content, unless otherwise specified by the Soils Engineering firm. Each lift shall be compacted to a minimum of 90% relative compaction (in accordance with ASTM: D-1557-78) and approved prior to the placement of the next layer of soil. Compaction tests shall be obtained at the discretion of the Soils Engineering firm but to a minimum of one test for every 500 cubic yards placed and/or for every 2 feet of compacted fill placed.

The minimum relative compaction shall be obtained in accordance with accepted methods in the construction industry. The final grade of the structural areas shall be in a dense and smooth condition prior to placement of slabs-on-grade or pavement areas. No fill soils shall be placed, spread or compacted during unfavorable weather conditions. When the grading is interrupted by heavy rains, compaction operations shall not be resumed until approved by the Soils Engineering firm.

Grading Observations

The controlling governmental agencies should be notified prior to commencement of any grading operations. This firm recommends that the grading operations be conducted under the observation of a Soils Engineering firm as deemed necessary. A 24 hour notice must be provided to this firm prior to the time of our initial inspection.

Observation shall include the clearing and grubbing operations to assure that all unsuitable materials have been properly removed; approve the exposed subgrade in areas to receive fill and in areas where excavation has resulted in the desired finished grade and designate areas of overexcavation; and perform field compaction tests to determine relative compaction achieved during fill placement. In addition, all foundation excavations shall be observed by the Soils Engineering firm to confirm that appropriate bearing materials are present at the design grades and recommend any modifications to construct footings.



APPENDICES

(In order of appearance)

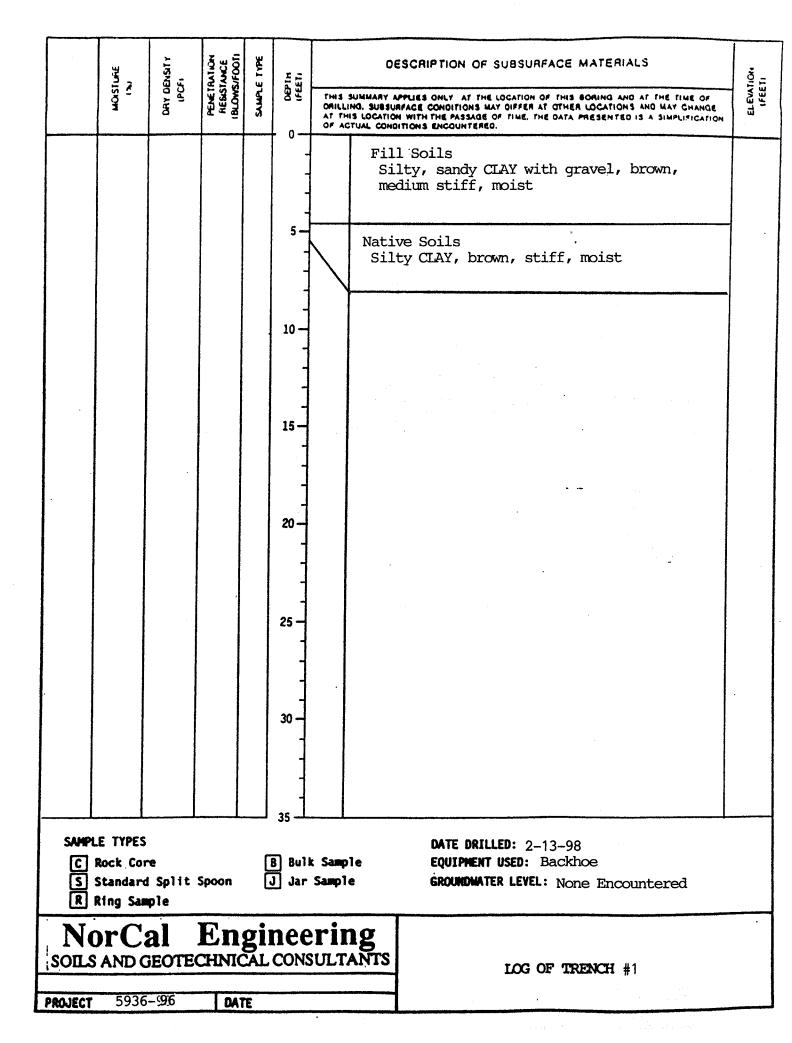
<u>Appendix A - Logs of Excavations</u> Log of Trenches T-1 to T-8

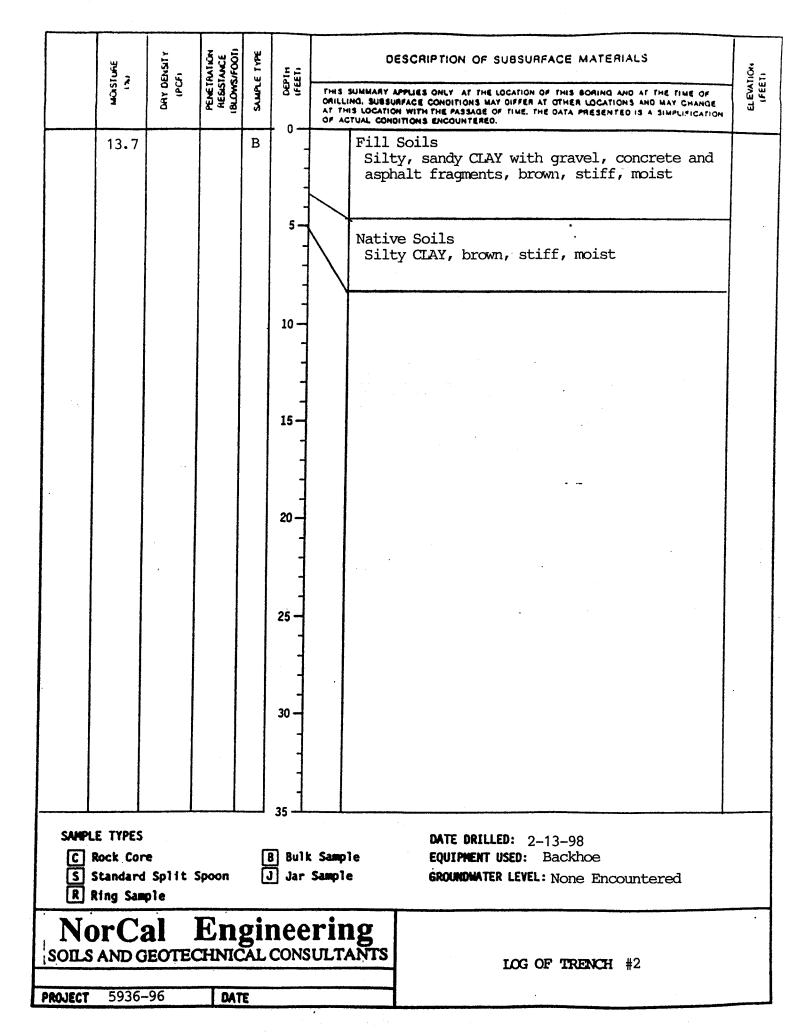
Appendix B - Laboratory Analysis

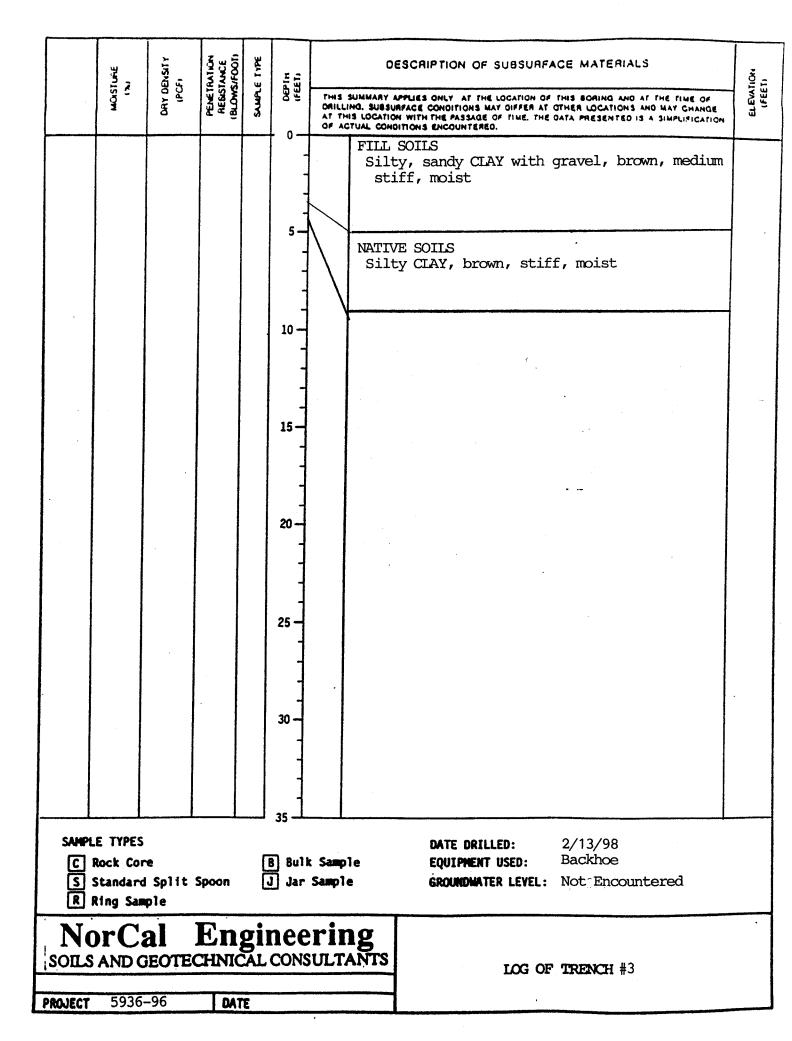
Table I - Maximum Density

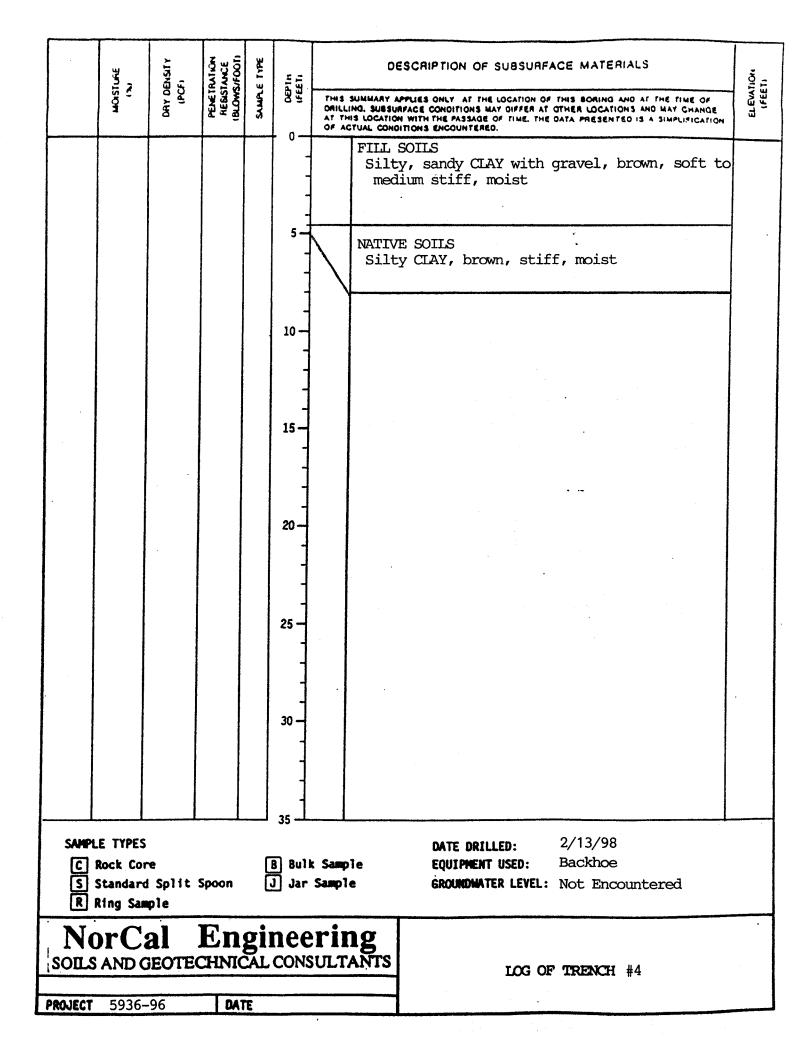
R-Value Tests

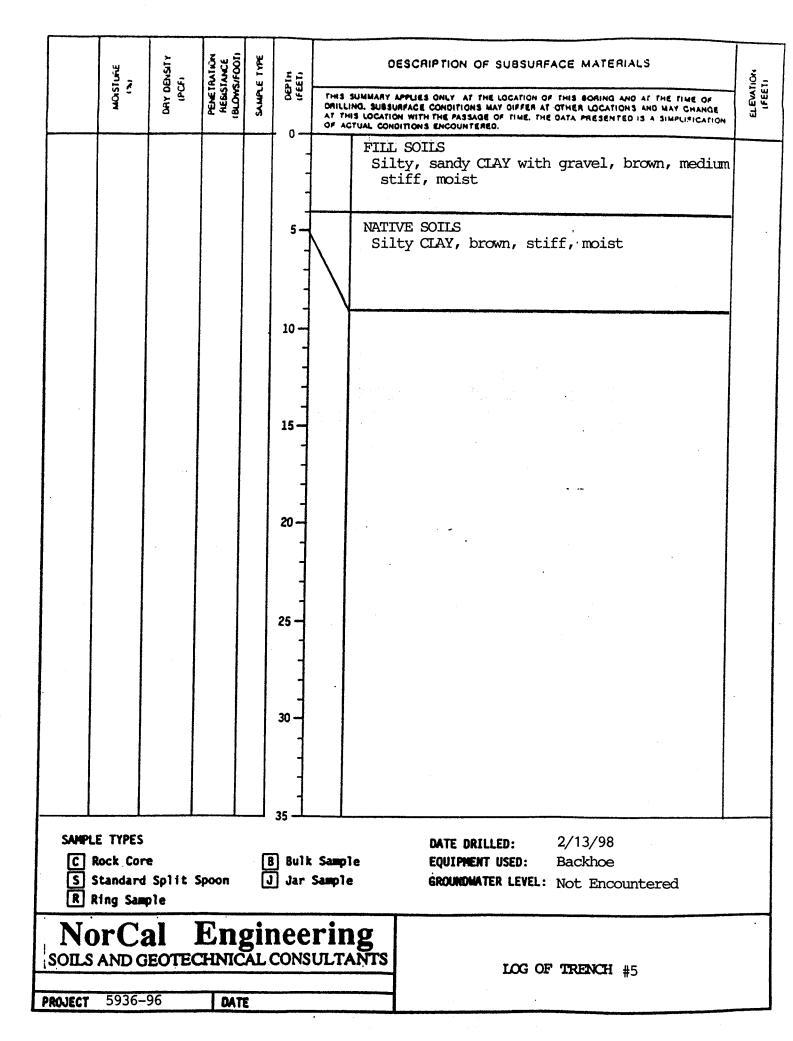
APPENDIX A

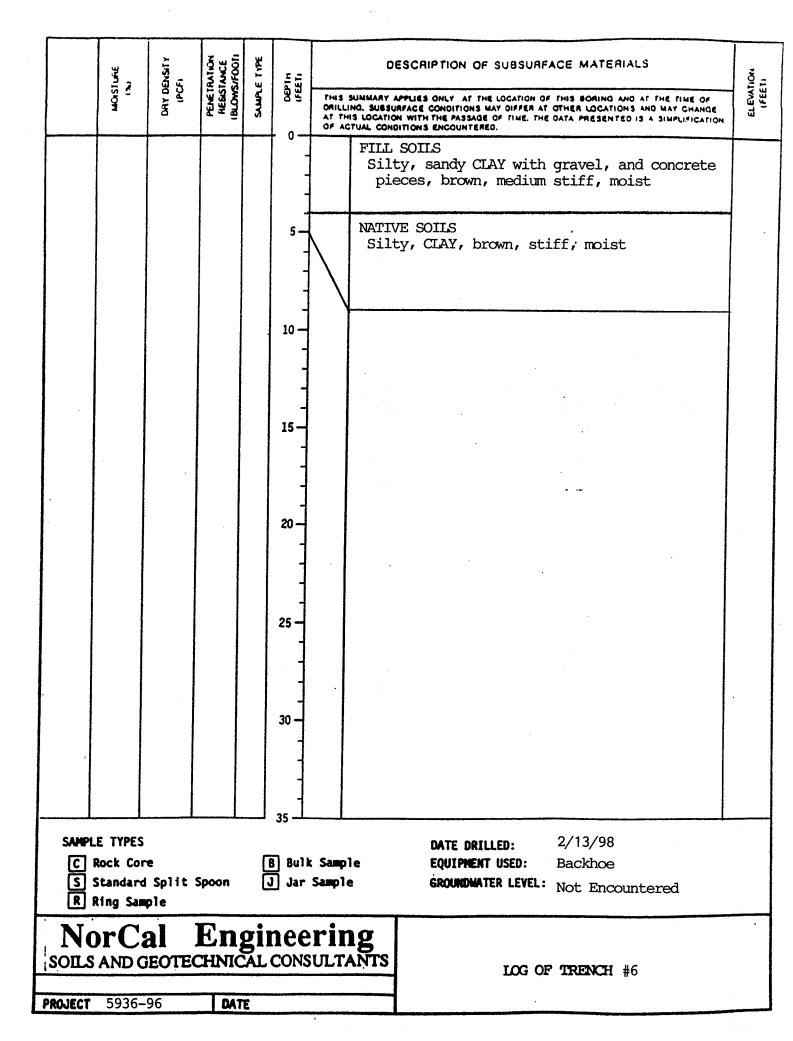


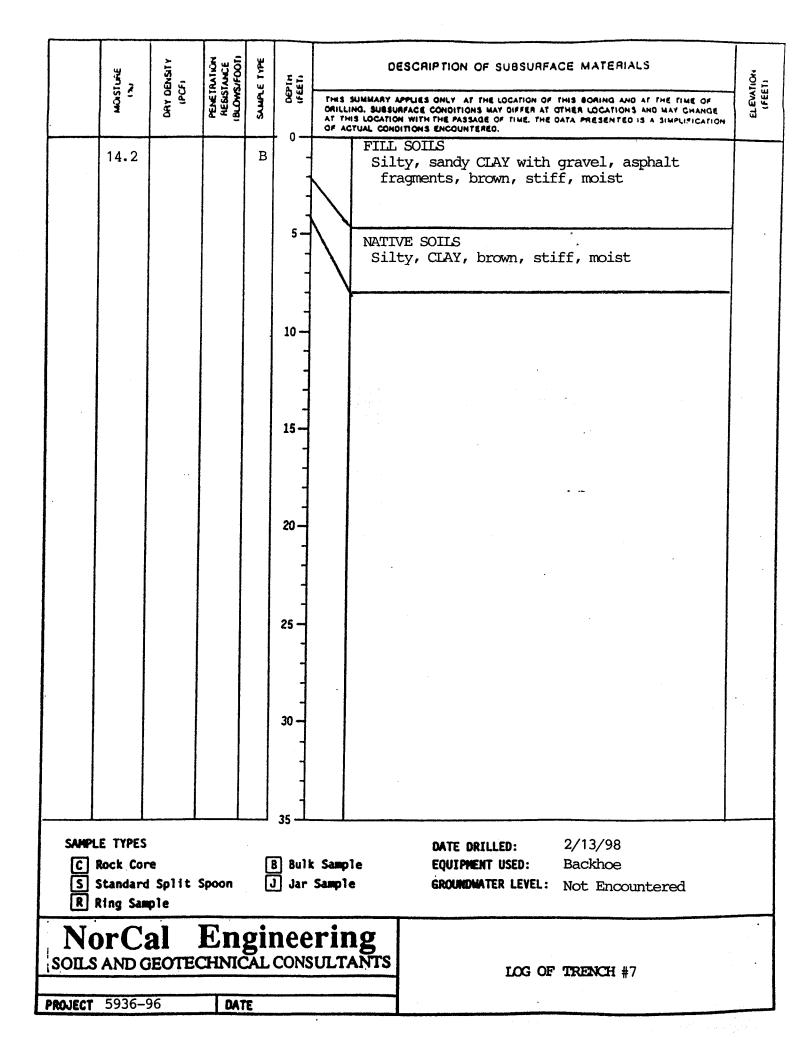


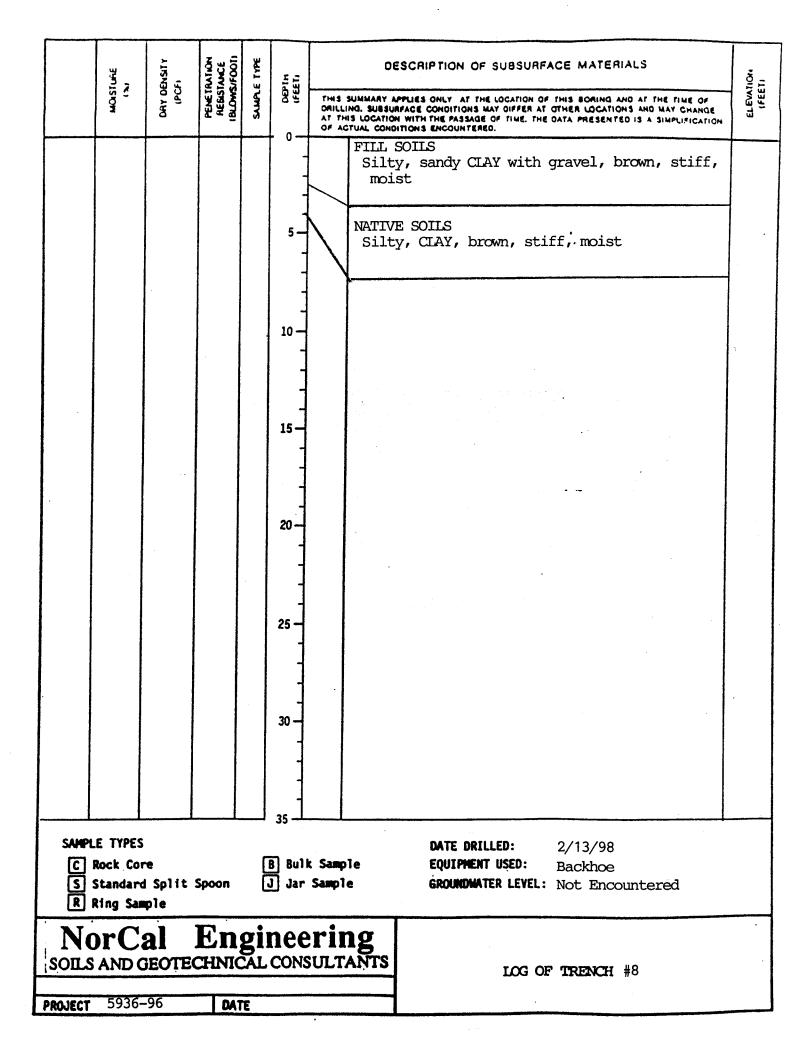












APPENDIX B

TABLE I MAXIMUM DENSITY TESTS (ASTM: D-1557-78)

Sample	Location	Classification	Optimum <u>Moisture</u>	Maximum Dry Density (lbs./cu.ft.)
I	B2 @ 0-2'	Silty, sandy CLAY with gravel, asphalt, concrete	12.5	121.0
II	B7 @ 0-2'	Silty, sandy CLAY with gravel, asphalt concrete	13.5	118.5

'R' VALUE CA 301

Client:

Norcal

Date:

3/20/98

Ву:

LD

Client's Job No.:

5936-96

Sample No.: #1

AGRA Reference:

8-212-1002

Soil Type: Tan Brown, Sandy Clay

TEST SPECIMEN		Α	В	С	D
Compactor Air Pressure	psi	90	65	170	
Initial Moisture Content	%	9.3	9.3	9.3	
Water Added	ml	50	35	65	
Moisture at Compaction	%	13.9	12.5	15.2	
Sample & Mold Weight	gms	3221	3257	3209	
Mold Weight	gms	2099	2100	2091	
Net Sample Weight	gms	1122	1157	1118	
Sample Height	in.	2.49	2.56	2.48	
Dry Density	pcf	119.9	121.7	118.6	
Pressure	lbs	4640	3660	6100	
Exudation Pressure	psi	369	291	486	
Expansion Dial	× 0.0001	29	14	76	
Expansion Pressure	psf	126	61	329	·
Ph at 1000lbs	psi	30	42	27	
Ph at 2000lbs	psi	65	95	57	
Displacement	turns	3.52	3.46	3.37	
R' Value		51	33	57	·
Corrected 'R' Value		51	34	57	

FINAL 'R' VALUE			
By Exudation Pressure (@	300 psi):	36	
By Epansion Pressure	:		
TI =			



'R' VALUE CA 301

Client:

Norcal

Date:

3/20/98

Ву:

LD

Client's Job No.:

5936-96

Sample No.: #2

AGRA Reference:

8-212-1002

Soil Type: D. Brown, Silty Clay

TEST SPECIMEN		А	В	С	D
Compactor Air Pressure	psi	35	45	20	
Initial Moisture Content	%	11.7	11.7	11.7	
Water Added	ml	50	35	65	
Moisture at Compaction	%	16.4	15.0	17.8	
Sample & Mold Weight	gms	3178	3190	3254	
Mold Weight	gms	2087	2097	2107	
Net Sample Weight	gms	1091	1093	1147	
Sample Height	in.	2.5	2.48	2.68	
Dry Density	pcf	113.6	116.2	110.1	
Pressure	lbs	3700	5400	3000	
Exudation Pressure	psi	295	430	- 239	
Expansion Dial	× 0.0001	13	50	0	
Expansion Pressure	psf	56	217	0	·
Ph at 1000lbs	psi	50	38	67	·
Ph at 2000lbs	psi	118	95	145	
Displacement	turns	3.32	3.05	3.84	
R' Value		21	36	6	
Corrected 'R' Value		21	36	8	

FINAL 'R' \	VALUE	
By Exudation Pressure (@ 3	300 psi):	22
By Epansion Pressure	:	-
Ti =		



